Carnegie Mellon
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Thoughts on Applying CMMI in Small Settings

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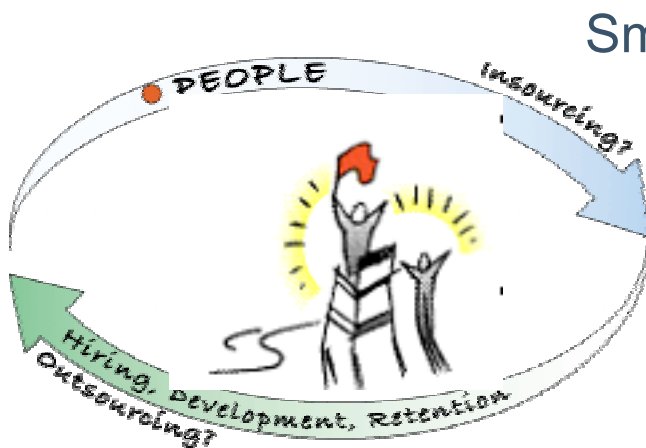Software Engineering Institute

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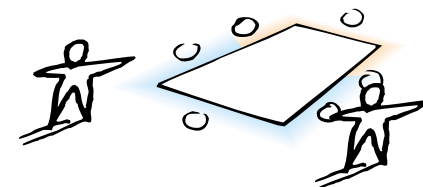Prescribed by ANSI Std Z39-18

Scope of CMMI in Small Settings Project

Small Companies

Small Organizations

Small Projects

Some issues are similar across all 3 settings; some are unique to a particular setting

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What is CMMI?

"The Purpose of CMM Integration is to provide guidance for improving your organization's processes and your ability to manage the *development, acquisition and maintenance of products and services*."

CMMI Version 1.1

- *Small projects, organizations, companies are very active in this arena!*

Why Do Small *Companies* Care About CMMI?

The need for operational effectiveness/efficiency increases as the size of the company grows

When partnering/subcontracting with larger companies, the expectation for CMMI-adherent practices is increasing

When independently bidding on some government business, CMMI-based appraisals/improvement are required

Why do Small *Organizations* Care About CMMI?

Many small organizations live within a larger organization that is actively using CMMI to support their business goals

- At some point, the small organization may not have a choice about adoption

- In some cases, CMMI can be a way for the small organization to gain better projects/customers, by demonstrating their competency in process management while preserving their agility and flexibility

Why Do Small *Projects* Care About CMMI?

Many small projects live within organizations adopting CMMI
- CMMI can provide a competitive differentiator if a small project has better processes and more agility than larger projects it's competing with
- CMMI can levy a tremendous overhead burden on small projects if it's implemented poorly for their context

Many small projects are suppliers of niche products/services to larger organizations/companies:
- The customer may require evidence of CMMI conformance
- The project may want to use CMMI to improve confidence of customers that it's "safe" to let the small project use their own processes instead of adopting the customer process

Challenge Areas for Small Settings Adopting CMMI

The Three Major Investment Elements Involved in CMMI-based Improvement:

- Appraisal
- Definition/Infrastructure Support
- Deployment

Larger companies typically have a resource (though not necessarily skill(!)) advantage with Appraisal and Definition, but have a distinct *disadvantage* in deployment

Appraisal and Infrastructure development are the two most visible cost areas for CMMI adoption

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The Appraisal Challenge

"Official" CMMI appraisals (called SCAMPI A Appraisals) consume a larger percent of the budget for a small company than a large one

- $ to hire lead appraisers
- Time away from work for staff to be interviewed
- Time away from work for internal appraisal team

Mitigation suggestions for small settings:

- Use less expensive methods (lots of consultants have them) to do a "pre-appraisal" to be sure that your money for a SCAMPI A will be worth your while
- See if you can get a lead appraiser to use "free" appraisal team resources, ie lead appraiser candidates that will volunteer to do an appraisal to help them move forward on their path toward authorization
- If your staff is not already familiar with CMMI, I strongly advise *against* just doing a self assessment

The Definition/Infrastructure Challenge

Defining/redefining processes to adhere to CMMI goals requires
- Model knowledge
- Process definition knowledge/skills
- Knowledge of the organization/company

Many large organizations have all 3; most small settings are missing the model knowledge at least, and often the process definition knowledge and skills are not emphasized

Mitigation suggestions:
- Watch for SEI and other industry publications on implementing CMMI for Small Businesses –several should come out over the next couple years
- If not pressured to implement CMMI fast, take it slow
  - One or two Process Areas per month and read them, connect them to your business issues, and see if you can find simple changes to your existing practices that would adhere to the model and give you more benefit than your current practice (note: there are more books coming out for CMMI "beginners", eg *CMMI Distilled* by Ahern et al)

The Deployment Challenge

The Challenge for Large Organizations/Companies:
- The larger the organization and the greater the variety of business contexts, the more difficult it is to find the "right" level of standard processes/tailoring guidelines
- Often deployment is not only multi-project, but multi-site and multi-customer type

The Challenge for Small Organizations/Companies/Projects:
- "The customer rules" – Many small organizations adopt/adapt their business practices directly from their customers or primes
- Some people self-select into small businesses because they want to "do their own thing" rather than follow corporate norms

Mitigation suggestions:
- Just like with large organizations, *demonstrating your ability to deliver what the customer wants* using your local business practices usually keeps them from forcing their practices on you
- Depending on the number of customer contexts, may want to create a standard process for each customer type as your starting point

The Deployment *Advantage* of Small Settings

The complexity and cost of training employees, creating/using metrics, deploying new templates and job aids is usually much smaller for small companies than large

- Even approaches like "one on one" sessions incorporated into other meeting contexts are feasible in small settings
- People who work in small settings are often, by definition, more flexible than those who have worked a long time in large settings
  - Adopting new practices isn't as much of a challenge for them

Implementing CMMI in Small Settings Project

SEI is responding to the community's call for guidance on implementing CMMI in small businesses, organizations, and projects.

We are
- piloting initial ideas
- gathering input from users and transition partners
- connecting with the international research community working in this area

Our goal is
Connect people in small settings and SEI partners working in them with useful assets that reflect the community's and the SEI's experiences

If you are implementing CMMI in small settings, we want to hear from you:
http://seir.sei.cmu.edu/feedback/smallCMMI.asp

Huntsville Pilot Project Overview (2003/2004)

A joint project performed by the partnership between the Software Engineering Institute (SEI) and AMRDEC SED to establish the technical feasibility of developing guidance and other special-purpose transition mechanisms to support adoption of CMMI by small and medium enterprises (25 to 250 employees in Huntsville)

Selected 2 Pilot companies: Analytical Services, Inc. (ASI) and Cirrus Technology, Inc. (CTI)

Pilot artifacts available at the SEI website:
- Toolkit (www.sei.cmu.edu/ttp/publications/toolkit)
- Presentations on the Pilot

Other reports planned:
- Experience reports

HSV CMMI-SME Pilots:
Selected Pilot Companies' Characteristics

- Both pilots are involved in product development for Government or engineering services to support product development
- One pilot company has a manufacturing element
- Both had recent experience with ISO 9000, but in different ways

Companies selected via formal process administrated by HSV Chamber of Commerce, SEI, and AMRDEC SED
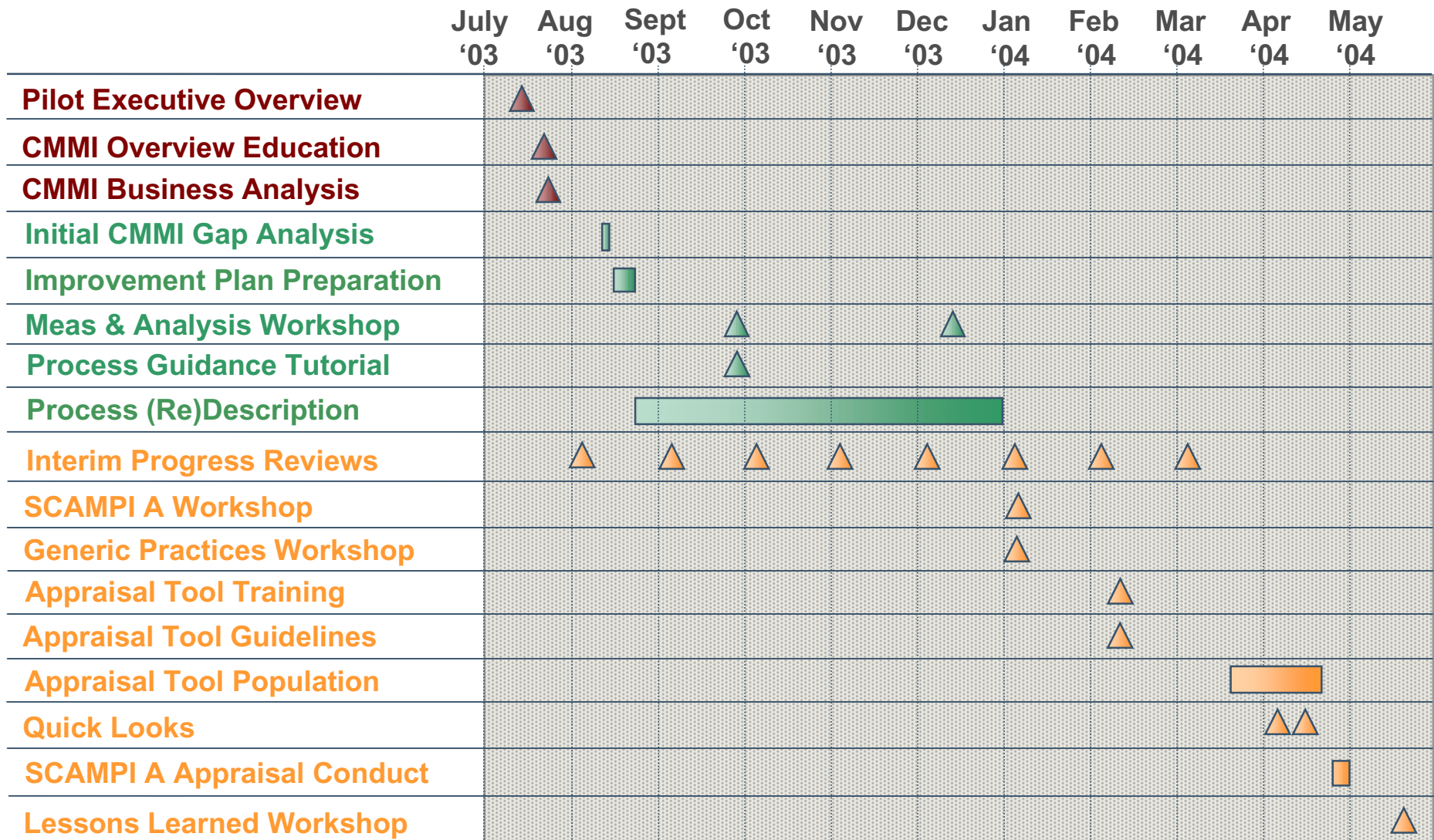
ASI's Experience of Benefits

Benefits from CMMI Adoption

- Participation in Pilot extremely beneficial for ASI
- CMMI Adoption has been worth investment
  - CMMI adoption enhanced and improved our QMS
  - Natural follow-on to ISO and provides continuous improvement
  - *Improved ability to organize and communicate status of projects to customers and other stakeholders*
  - *Addresses customer projects with process requirements*
  - *Reduced training time for new employee*
  - *Prevented requirements creep and ensured on-time and below budget project completion*
  - Supports company objectives
  - Provides path for taking the company to the next level

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ASI Analytical Services, Inc.

ASI CMMI Pilot Summary

Initiated CMMI Pilot Project – Aug '03
- Project Planning (PP)
- Requirements Management (REQM)
- Measurement and Analysis (M&A)

Completed Pilot in May '04 – Culminated with SCAMPI A Appraisal

Appraisal of **3** process areas above with addition of:
- Organizational Training (OT)
- Organizational Process Focus (OPF)

Achieved Target Capability Level Profile

- 2 projects across Engineering Services Business Unit
  - Database Upgrade—4 people
  - Logistics Deployment – 1 person managing external team

CTI CMMI Pilot Summary

Initiated CMMI Pilot Project – Aug '03
- Project Planning (PP)
- Requirements Management (REQM)
- Project Monitoring & Control

2 projects:
- Research & Development – 2 people
- Manufacturing – 11 people

Put pilot on hold for six weeks to deal with some business restructuring needed due to recent acquisitions

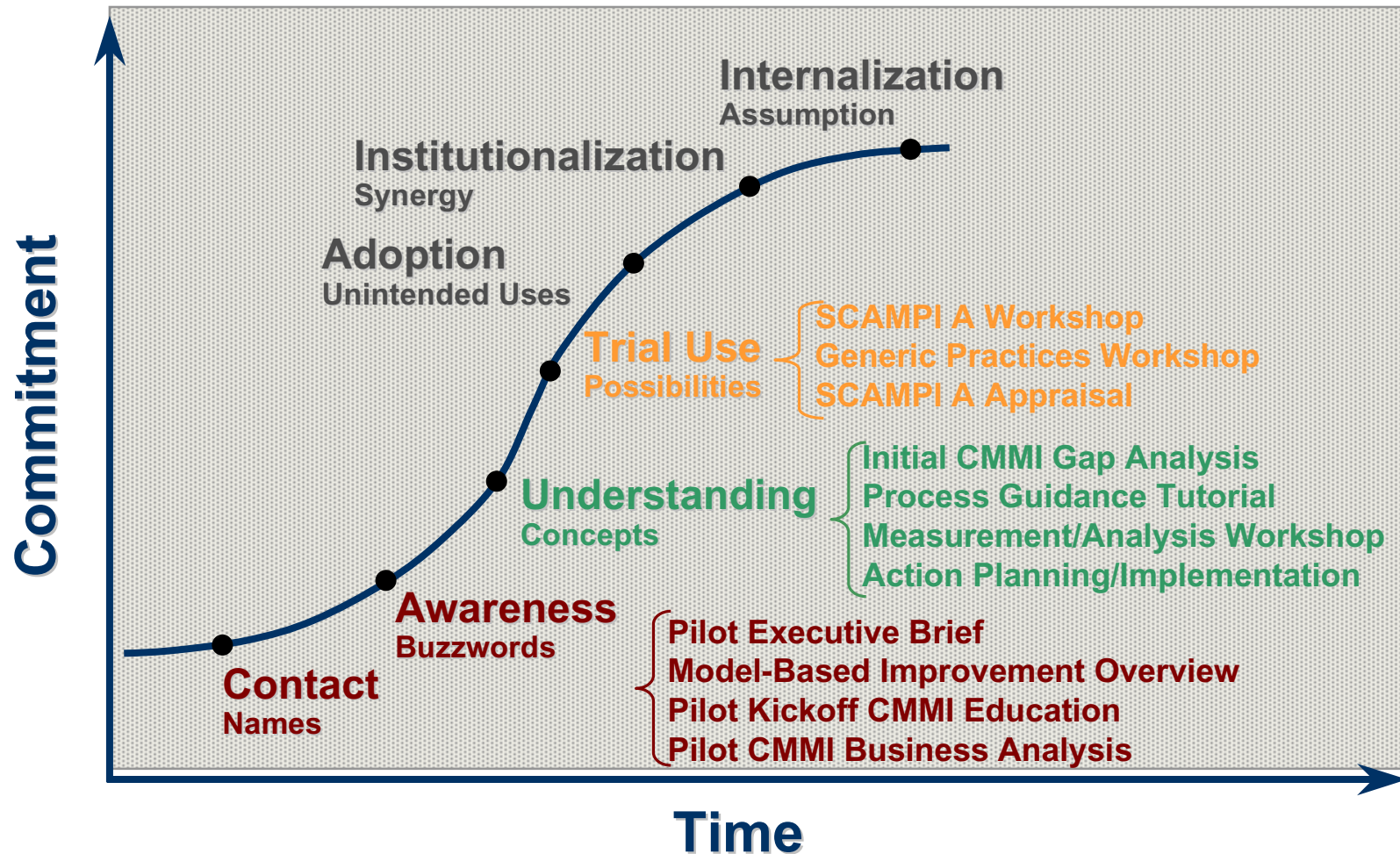Completed Pilot in Apr '04 – Culminated with SCAMPI A Appraisal

Appraisal of **3** process areas above

Achieved Target Capability Level Profile
- CL1 for all 3 Process Areas

Summary of Materials Provided by Pilot

Internalization
Assumption

Institutionalization
Synergy

Adoption
Unintended Uses

Trial Use
Possibilities

- SCAMPI A Workshop
- Generic Practices Workshop
- SCAMPI A Appraisal

Understanding
Concepts

- Initial CMMI Gap Analysis
- Process Guidance Tutorial
- Measurement/Analysis Workshop
- Action Planning/Implementation

Awareness
Buzzwords

Contact
Names

- Pilot Executive Brief
- Model-Based Improvement Overview
- Pilot Kickoff CMMI Education
- Pilot CMMI Business Analysis

Commitment (vertical axis)

Time (horizontal axis)

Adapted from Patterson & Conner, "Building Commitment to Organizational Change", 1982.

CMMI in Small Settings HSV Pilot Toolkit

The set of assets used in working with the two HSV pilots:
- Process descriptions of activities used with the pilots
- Presentations/tutorials
- Appraisal (SCAMPI B and A) support tools
- Templates

Assets organized around Adoption Commitment Curve to make it easy to see the assets available to support different adoption activities

Link to Toolkit

Initial Conclusions on Technical Feasibility of Using CMMI in Small Businesses

- CMMI provides a set of best practices from which small businesses can benefit

- The continuous representation of CMMI allows small companies to focus on improvements that have the highest payoff for the company while learning about benefits of other elements of the model

- Aligning improvement with business goals is particularly important for small businesses, and in this case was easily achieved

- Simple CMMI-based improvements can have a significant impact in small organizations

- "Changing" the practices within the model isn't necessary in most cases; finding alternative practices and being creative in work products is often more relevant

- Both CMMI and SCAMPI A (the CMMI appraisal method) scale down to fit small settings

The greatest challenge for small businesses is the affordability of Subject Matter Experts, and the infrastructure and appraisal costs

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A few relevant resources…

http://www.sei.cmu.edu/ttp/presentations
- For SuZ Garcia presentations, including all those she has written related to the Huntsville pilots

http://register.ndia.org/interview/register.ndia?PID=Brochure&SID=_1DO0VQR4N&MID=5110

- For proceedings of NDIA conferences, including the CMMI User's Conference for 2004, containing an entire track of presentations on using CMMI in small settings, some of which are from the HSV pilots (2004 CMMI User's Conference proceedings probably not available until Dec 2004, since conference is being held this week!)

http://www.sei.cmu.edu/ttp/publications/toolkit

- For the CMMI Huntsville Pilot Toolkit and Experience Reports, as they become available